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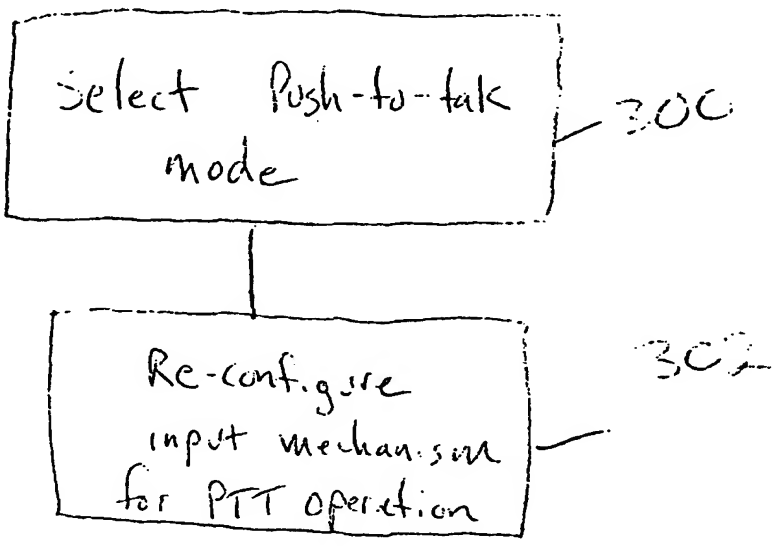
(54) Title: SYSTEM AND METHOD FOR PROVIDING PUSH-TO-TALK FEATURE FOR WIRELESS COMMUNICATION SYSTEMS



(57) Abstract: A method and apparatus for providing push-to-talk functionality to a conventional telephone. An existing key or switch located on a conventional telephone is selected to act as a push-to-talk switch. When a push-to-talk mode of operation is entered, the preselected key or switch is reconfigured to act as a push-to-talk switch. When the preselected key or switch is pressed while the telephone is in the push-to-talk mode, transmission from the telephone is enabled, allowing a user to transmit information to one or more entities. Transmission generally accurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

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SYSTEM AND METHOD FOR PROVIDING PUSH TO TALK FEATURE WIRELESS COMMUNICATION SYSTEMS

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention pertains generally to the field of wireless communications, and more specifically a method and apparatus for providing push-to-talk functionality to a conventional telephone.

II. Background

The field of wireless communications has experienced tremendous growth in the past several years. Cellular telephones have become commonplace, as consumers have embraced the idea of wireless communications. Millions of phones have been manufactured and sold to consumers to date.

A conventional wireless telephone typically comprises a keypad for entering information into the telephone, and a display for allowing a user to see the entries that have been made, or to view information that may be transmitted to the wireless telephone from a remote source. Many wireless telephones have at least one key or switch on one side of the telephone housing, allowing additional functionality. This switch typically controls a number of telephonic functions including ringer volume, earpiece volume, and other functions, often through the use of an electronic menu which is viewed on the display. This switch can take many forms, including a toggle switch, rocker switch, or a shuttle dial switch, the latter being a rotatable dial switch in combination with a push switch.

Recently, wireless telephones have been developed which offer communications on a "one-to-many" basis, mimicking walkie-talkies or conventional LMR dispatch radios. Typically, a group of users, or net, is predefined. Each user or member of the net may transmit to any and all net members simultaneously by pressing a push-to-talk switch located on his or her wireless communication device. The push-to-talk switch is generally located on one side of the wireless telephone, allowing a user ergonomic control over the switch. To speak to other members of the net, the push-to-talk switch is pressed and held for the duration of the transmission. To listen to other net members, the push-to-talk switch is released.

Push-to-talk communications are becoming increasingly popular. However, a special wireless telephone having a push-to-talk switch must be purchased for use in group communication systems. Often, users already own one or more conventional wireless communication devices. Therefore, it would be desirable for such users to convert their conventional telephones into a push-to-talk capable device, without having to incur the expense of purchasing a telephone with such capabilities.

SUMMARY OF THE INVENTION

The present invention is a method and apparatus for providing push-to-talk functionality to a conventional telephone. In an exemplary embodiment, an existing key or switch located on a conventional telephone is preselected to act as a push-to-talk switch. During a push-to-talk mode of operation, when the preselected key or switch is pressed, transmission from the telephone is enabled, allowing a user to transmit information to one or more users. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

Push-to-talk functionality is realized by enabling a push-to-talk mode on the telephone. In the exemplary embodiment, this is accomplished by accessing a menu on a telephone display using one or more existing keys or switches located on the telephone housing. When the push-to-talk mode has been entered, at least one preselected key or switch is reconfigured to act as a push-to-talk switch. In a conventional telephone mode, the preselected key or switch is configured to operate a different function than the push-to-talk function which is enabled during the push-to-talk mode.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a conventional telephone incorporating a preferred embodiment of the present invention;

FIG. 2 illustrates a functional block diagram detailing the functional components of the conventional telephone of FIG. 1; and

FIG. 3 is a flow diagram detailing the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments described herein are described with respect to a wireless communication device, specifically a wireless telephone. While the present invention is especially suited for the transmission of voice information using such a wireless telephone, it should be understood that the present invention may be employed in various other types of applications, such as the transmission of audio, video, and data using such devices as landline telephones, satellite telephones, computers, and various video devices.

FIG. 1 illustrates a conventional wireless telephone **100** as used in the preferred embodiment of the present invention. Interface mechanisms, or keys, **102** allow a user to interface with telephone **100**, while display **104** allows the user to monitor the status and operation of telephone **100**. For example, to place a conventional telephone call, that is, a call from one user to another user, a telephone number is typically entered into telephone **100** by a first user pressing keys **102** corresponding to the desired telephone number corresponding to a second user. Display **104** typically displays an integer corresponding to each key **102** that is pressed. After the desired telephone number has been entered into telephone **100**, a key is pressed to initiate the call, shown in FIG. 1 as a "send" key. Audio information, typically in the form of human speech, is received by microphone **108** while audio information from the second user is broadcast through speaker **110**.

Many wireless telephones today have at least one interface mechanism **106** located on a side of telephone **100** for controlling various functions related to the operation of telephone **100**. For example, interface mechanism **106** may comprise a rocker switch, rotatable dial, or shuttle dial to control an electronic menu which can be displayed on display **104**. Interface mechanism **106**, in combination with the electronic menu, and/or other interface mechanisms **102**, allows a user to control various functions of telephone **100**, such as ringer type and volume, various security features, display features, operational features, voice mail features, and so on.

In accordance with a preferred embodiment of the present invention, at least one interface mechanism **102, 106**, or both, are reconfigured to enable a push-to-talk function when a push-to-talk mode of operation is chosen. An additional menu selection is added to the electronic menu to allow a

user to choose a push-to-talk mode of operation. When the push-to-talk mode of operation is selected, the one or more interface mechanisms are reconfigured to act as a push-to-talk switch.

A push-to-talk mode of operation, otherwise known as group mode, one-to-many mode, or net broadcast mode, typically allows a user to listen to one or more members of a communication net. A communication net is a defined list of people who are able to communicate simultaneously with each other, generally through a central station of some kind. The communication net may be predetermined, or it may be allow users to join and leave the net at will. Each net member uses a push-to-talk capable telephone to transmit information to other net members. The net can be regulated or unregulated. In a regulated net, only one net member can transmit at any given time. Permission to transmit is granted generally by a central communication manager. In an unregulated net, otherwise known as a conference bridge, more than one member may transmit to other net members at any given time, however, this often results in unintelligible reception to the users due to the interference between multiple simultaneous transmissions.

FIG. 2 is a functional block diagram of telephone **100** in accordance with the teachings of the present invention. The functional blocks are shown for illustrative purposes to explain the present invention and, therefore, many of the other functions of a wireless telephone, which are well known in the art, have been omitted for clarity. Although FIG. 2 illustrates the basic functional elements of a wireless digital telephone, the present invention is not intended to be limited to a wireless telephone, or to a specific modulation scheme, protocol, or standard.

Referring back to FIG. 2, during conventional operation of telephone **100**, acoustic energy, most often in the form of human speech, is received by microphone **108**, where it is converted into electrical energy in the form of an analog waveform and provided to analog-to-digital (A/D) converter **200**. A/D **200** receives the analog waveform and converts it into a digital representation, often in the form of a pulse coded modulated (PCM) digital signal. The digital signal is then provided to modulator **202**, where the digital signal is modulated in accordance with the particular type of transmission scheme in use. For example, modulator **202** could be a CDMA modulator, a TDMA modulator, an AMPS modulator, or any other modulator known in the art. The modulated digital signal is then provided

to RF transceiver **204**, where it is upconverted to a very high frequency for transmission through antenna **206**.

Transmissions to telephone **100** are received by antenna **206** and provided to RF transceiver **204** where the transmission is downconverted from a very high frequency to an intermediate frequency. The downconverted signal is then provided to demodulator **208**, where the information signal, in digital form, is extracted from the signal provided by RF transceiver **204**. The digitized information signal is then provided to digital-to-analog (D/A) converter **210**, where the digitized signal is converted into an analog signal, suitable for speaker **212**. Speaker **212** converts the analog electrical signal into acoustic energy which may be heard by a user. The audio output level from speaker **212** is typically only audible by placing speaker **212** in proximity to the user's ear. However, other speakers are available which broadcast audio information at much greater level so that the user can hear the audio information even if speaker **212** is not in direct proximity to the user's ear. In an alternative embodiment, telephone **100** could comprise two speakers **212**, one for use during conventional telephone operation, where audio information is broadcast a relatively low output level, and another for use during a push-to-talk mode of operation, where audio information is broadcast at a relatively high output level.

The functions of the various blocks shown in FIG. **2** are generally coordinated by processor **214**, although other configurations are certainly possible. Processor **214** is a generally a well-known digital computing device used in connection with a set of program instructions pre-stored in memory **216**. Processor **214** generally controls the functions of each block shown in FIG. **2**, although each functional element could have its own processor, memory, and instruction set for performing specific operations of telephone **100**. Processor **214** is controlled by commands entered by a user via input mechanisms **102** and **106**, as described above. Information may be visually provided to the user via display **104**.

During a conventional mode of operation, input mechanisms **102** and **106** are configured for convention telephone functions. For example, input mechanism **102** could be a key on telephone **100** for entering data, such as digits corresponding to a telephone number, or input mechanism **106** could be a shuttle dial switch for controlling volume or navigating an electronic menu offered by display **104**. Information pertaining to the electronic menu are stored in memory **216**. Input mechanism **102** and **106** send an electronic signal to processor **214**, which in turn controls any number of functional

elements to achieve a particular result, such as entering a telephone number and initiating a telephone call.

During a push-to-talk mode of operation, input mechanism **102**, **106**, or both are reconfigured to act like a push-to-talk switch on a push-to-talk communication device. A user can select a push-to-talk mode of operation using a series of inputs from input mechanism **102** and/or **106** in conjunction with an electronic menu provided by display **104**. Alternatively, a push-to-talk mode could be entered by simply pressing a dedicated push-to-talk key, which, when depressed, reconfigures telephone **100** into a push-to-talk telephone.

After the push-to-talk mode of operation has been entered, one or more input mechanisms **102/106** are reconfigured to act as a push-to-talk switch. For example, after the push-to-talk mode of operation has been entered, input mechanism **106** could be preselected to act as a push-to-talk switch. In another embodiment, input mechanism **102** could be reconfigured to act as a push to talk switch. For example, a "1" key on telephone **100**, used to enter the digit "1" during a conventional mode of operation of telephone **100**, is reconfigured to act as a push-to-talk switch. To transmit audio information, i.e. speech, to one or more net members, a user of telephone **100** presses the "1" key and holds it for the duration of the transmission. Processor **214** receives an electrical signal from the preselected key, in this case the "1" key, signifying that the "1" key is being pressed. The electrical signal generally persists until the "1" key is released. During the time that the "1" key is pressed, processor **214** enables any audio information received by microphone **108** to be transmitted to one or more users. This can be done in any number of methods known in the art. For example, when processor **214** detects that the preselected key or keys is pressed, signals from microphone **108** are processed in much the same way as in the conventional telephone mode.

In addition, during the period when the "1" key is pressed, processor **214** may, in an alternative embodiment, disable speaker **212**, using techniques well known in the art. Generally, in a push-to-talk mode of operation, a user's transmission is broadcast to all net members, including the user generating the transmission. It is undesirable to have a user's transmission broadcast back to that user while speaking. Therefore, processor **214** will generally disable speaker **212** while the push-to-talk switch is pressed.

When the push-to-talk switch is released, processor **214** detects the event by detecting a change in the electrical signal sent by the key or input mechanism **102/106** being released. In response to the release of the key, processor **214** disables audio information from being transmitted to other net members. Processor **214** may disable the audio information in one of several well known methods used in the art. For example, processor **214** could simply open a switch (not shown) located between microphone **108** and A/D **200**, thereby preventing audio signals from being processed. Alternatively, processor **214** could alter the digitized audio signal at any point in the transmission path to represent a silent or near-silent state. Alternatively still, processor **214** could reduce the audio signal amplitude to a negligible level by reducing one or more amplifier gains from amplifiers located at or within microphone **108** or A/D **200**. Generally, the signal from microphone **108** requires amplification to be processed by other functional components. This is normally accomplished by using one or more adjustable amplifiers.

In addition to disabling audio information from being transmitted, processor **214**, in an alternative embodiment, re-enables speaker **110**, if speaker **110** was disabled during the period of time that the push-to-talk switch was pressed. Again, processor **214** can use one of many well known techniques to re-enable speaker **110**.

FIG. **3** illustrates a flow diagram of the method of the present invention. In step **300**, a user selects a push-to-talk mode of operation for telephone **100**. As described above, the push-to-talk mode of operation can be entered by pressing a dedicated key or switch, or it can be selected by selecting a push-to-talk mode of operation from an electronic menu using display **104**.

In step **302**, processor **214** reconfigures one or more input mechanisms to act as a push-to-talk switch. In the exemplary embodiment, input mechanism **106**, comprising a shuttle dial switch, is reconfigured as the push-to-talk switch. However, any other input mechanism **102** on telephone **100** could alternatively, or in addition, be reconfigured to act as a push to talk switch. For example, the "2" key could be reconfigured as the push-to-talk switch.

The input mechanism(s) acting as a push-to-talk switch are chosen prior to loading memory **216** with programming instructions. The programming instructions comprise computer code which allows processor **214** to control the functionality of telephone **100**. Generally, the

programming instructions are loaded into memory **216** during manufacture of telephone **100**, and are not accessible to a user. However, in another embodiment, the programming instructions allow a user to select which key will be used as a push-to-talk switch. For example, after a user selects the push-to-talk mode of operation, the next key that is pressed will be designated the push-to-talk switch by processor **214**.

The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without the use of the inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

WE CLAIM:

CLAIMS

1. An apparatus for providing push-to-talk functionality to a conventional telephone, comprising:

an input mechanism located on said conventional telephone, configurable for use as a conventional telephone function while said conventional telephone is in a conventional telephone mode, and as a push-to-talk function while said conventional telephone is in a push-to-talk mode.

2. The apparatus of claim 1 wherein said conventional telephone function comprises a data entry function.

3. The apparatus of claim 1 wherein said conventional telephone function comprises a menu navigation function.

4. The apparatus of claim 1 wherein transmissions from said conventional telephone are enabled while said conventional telephone is in said push-to-talk mode and said shuttle dial is pressed.

5. The apparatus of claim 1 wherein said input mechanism comprises at least one preselected key located on said conventional telephone.

6. The apparatus of claim 1 further comprising input means for configuring said conventional telephone for said conventional telephone mode or said push-to-talk mode.

7. The apparatus of claim 1 further comprising:

a electronic menu of options stored in a memory; and

a display for presenting said menu of options, said menu of options comprising an option for entering said push-to-talk mode; and

a processor for receiving commands from said input mechanism, for processing said commands in accordance with pre-stored programming instructions stored in said memory, and for enabling transmissions from said conventional telephone while said conventional telephone is in said push-to-talk mode and said input mechanism is pressed by a user.

8. The apparatus of claim 1 wherein said input mechanism is a preselected switch.

9. The apparatus of claim 1 wherein said input mechanism is a preselected key.

10. The apparatus of claim 1 wherein said input mechanism is chosen by a user after said push-to-talk mode has been entered.

11. A method for providing push-to-talk functionality to a conventional telephone, comprising the steps of:

selecting a push-to-talk mode of operation for said conventional telephone; and

reconfiguring an input mechanism located on said conventional telephone from a conventional telephone function to a push-to-talk switch.

12. The method of claim 11 wherein said conventional telephone function comprises entering data into said conventional telephone.

13. The method of claim 11 wherein said conventional telephone function comprises navigating an electronic menu.

14. The method of claim 11 wherein the step of selecting a push-to-talk mode of operation comprises:

displaying a menu of options, said menu of options including an option for entering said push-to-talk mode; and

selecting said push-to-talk mode.

15. The method of claim 11 wherein the step of selecting a push-to-talk mode of operation comprises:

displaying a menu of options, said menu of options including an option for entering said push-to-talk mode; and

selecting said push-to-talk mode using a second input mechanism.

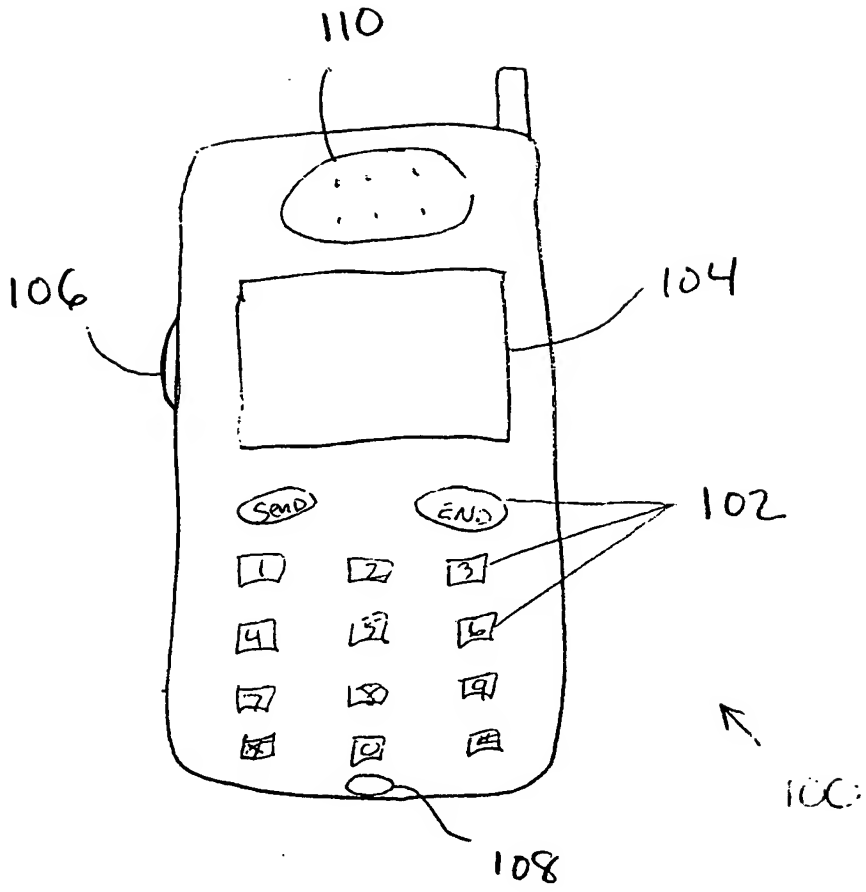
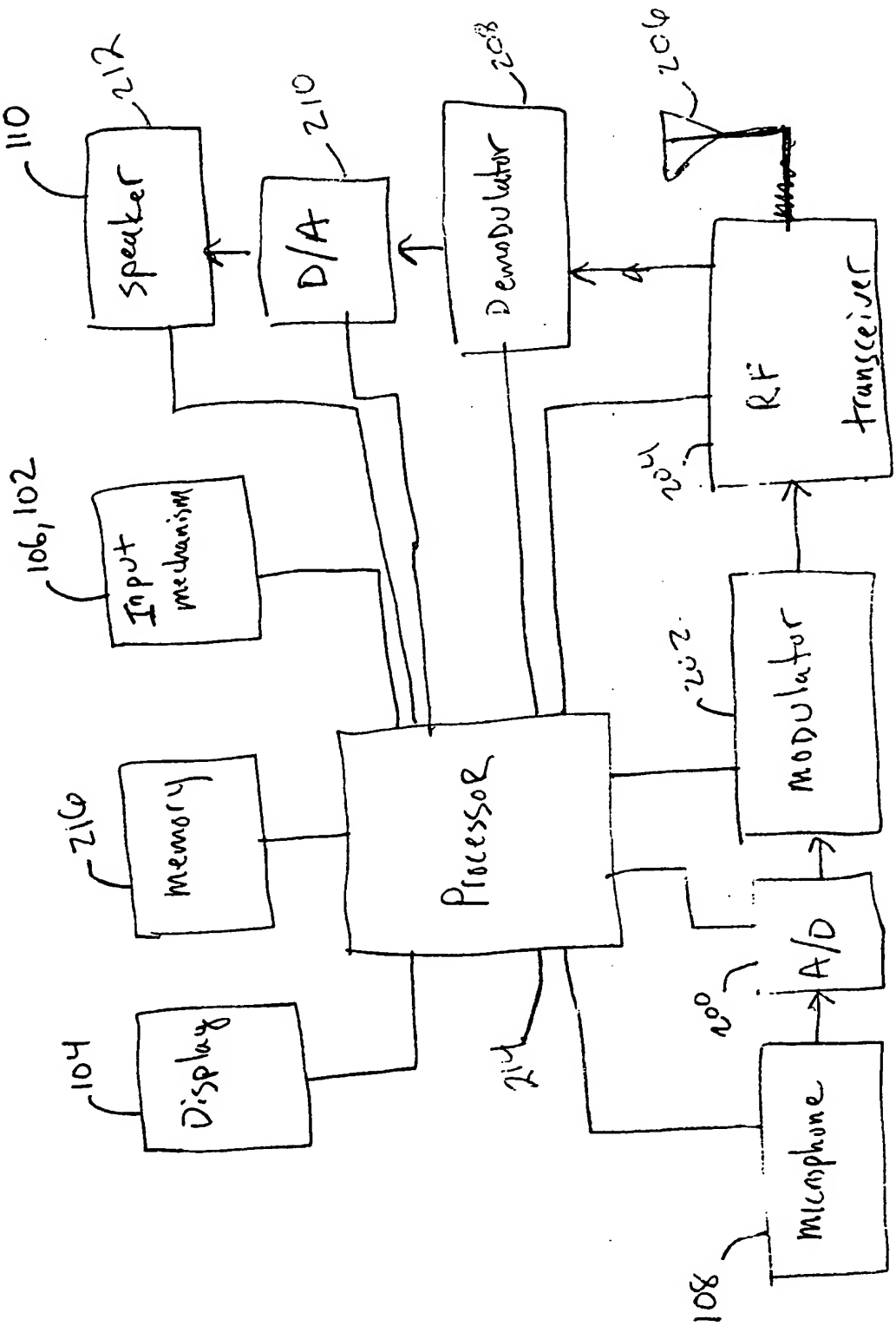


Fig 1.

Fig 2.



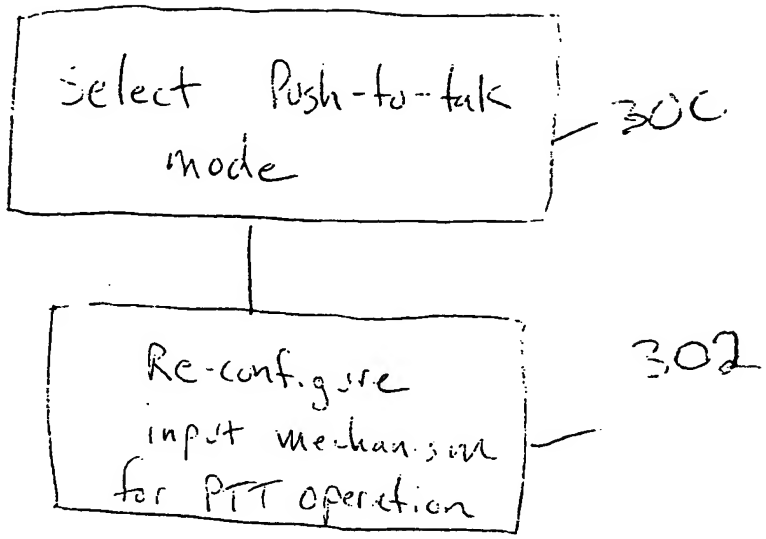

Select Push-to-talk mode
300
Re-configure input mechanism for PTT operation
302

Fig 3

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/725 H04Q7/28 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 881 370 A (FORD ROBERT B ET AL) 9 March 1999 (1999-03-09) column 1, line 60 -column 3, line 39	1-15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 April 2001	20/04/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vaucois, X

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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US 5881370 A	09-03-1999	GB 2318706 A	29-04-1998

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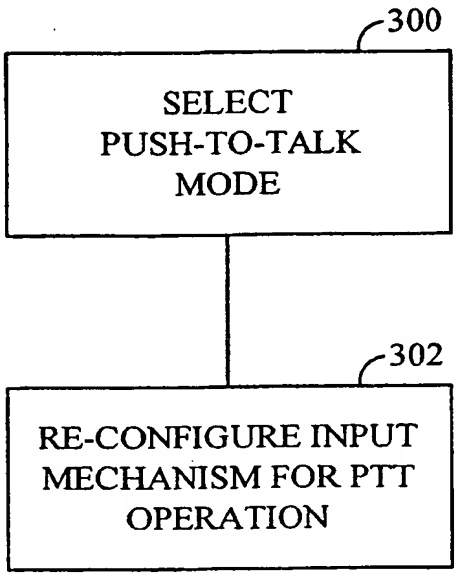
(54) Title: SYSTEM AND METHOD FOR PROVIDING PUSH-TO-TALK FEATURE FOR WIRELESS COMMUNICATION SYSTEMS



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The field of wireless communications has experienced tremendous growth in the past several years. Cellular telephones have become commonplace, as consumers have embraced the idea of wireless communications. Millions of phones have been manufactured and sold to consumers to date.

A conventional wireless telephone typically comprises a keypad for entering information into the telephone, and a display for allowing a user to see the entries that have been made, or to view information that may be transmitted to the wireless telephone from a remote source. Many wireless telephones have at least one key or switch on one side of the telephone housing, allowing additional functionality. This switch typically controls a number of telephonic functions including ringer volume, earpiece volume, and other functions, often through the use of an electronic menu which is viewed on the display. This switch can take many forms, including a toggle switch, rocker switch, or a shuttle dial switch, the latter being a rotatable dial switch in combination with a push switch.

Recently, wireless telephones have been developed which offer communications on a "one-to-many" basis, mimicking walkie-talkies or conventional LMR dispatch radios. Typically, a group of users, or net, is predefined. Each user or member of the net may transmit to any and all net members simultaneously by pressing a push-to-talk switch located on his or her wireless communication device. The push-to-talk switch is generally located on one side of the wireless telephone, allowing a user ergonomic control over the switch. To speak to other members of the net, the push-to-talk switch is pressed and held for the duration of the transmission. To listen to other net members, the push-to-talk switch is released.

Push-to-talk communications are becoming increasingly popular. However, a special wireless telephone having a push-to-talk switch must be purchased for use in group communication systems. Often, users already own one or more conventional wireless communication devices. Therefore, it would be desirable for such users to convert their conventional telephones into a push-to-talk capable device, without having to incur the expense of purchasing a telephone with such capabilities.

SUMMARY OF THE INVENTION

The present invention is a method and apparatus for providing push-to-talk functionality to a conventional telephone. In an exemplary embodiment, an existing key or switch located on a conventional telephone is preselected to act as a push-to-talk switch. During a push-to-talk mode of operation, when the preselected key or switch is pressed, transmission from the telephone is enabled, allowing a user to transmit information to one or more users. Transmission generally occurs for as long as the preselected key or switch is pressed. When the preselected key is released, the telephone is disabled from transmitting information.

Push-to-talk functionality is realized by enabling a push-to-talk mode on the telephone. In the exemplary embodiment, this is accomplished by accessing a menu on a telephone display using one or more existing keys or switches located on the telephone housing. When the push-to-talk mode has been entered, at least one preselected key or switch is reconfigured to act as a push-to-talk switch. In a conventional telephone mode, the preselected key or switch is configured to operate a different function than the push-to-talk function which is enabled during the push-to-talk mode.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a conventional telephone incorporating a preferred embodiment of the present invention;

FIG. 2 illustrates a functional block diagram detailing the functional components of the conventional telephone of FIG. 1; and

FIG. 3 is a flow diagram detailing the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments described herein are described with respect to a wireless communication device, specifically a wireless telephone. While the present invention is especially suited for the transmission of voice information using such a wireless telephone, it should be understood that the present invention may be employed in various other types of applications, such as the transmission of audio, video, and data using such devices as landline telephones, satellite telephones, computers, and various video devices.

FIG. 1 illustrates a conventional wireless telephone **100** as used in the preferred embodiment of the present invention. Interface mechanisms, or keys, **102** allow a user to interface with telephone **100**, while display **104** allows the user to monitor the status and operation of telephone **100**. For example, to place a conventional telephone call, that is, a call from one user to another user, a telephone number is typically entered into telephone **100** by a first user pressing keys **102** corresponding to the desired telephone number corresponding to a second user. Display **104** typically displays an integer corresponding to each key **102** that is pressed. After the desired telephone number has been entered into telephone **100**, a key is pressed to initiate the call, shown in FIG. **1** as a "send" key. Audio information, typically in the form of human speech, is received by microphone **108** while audio information from the second user is broadcast through speaker **110**.

Many wireless telephones today have at least one interface mechanism **106** located on a side of telephone **100** for controlling various functions related to the operation of telephone **100**. For example, interface mechanism **106** may comprise a rocker switch, rotatable dial, or shuttle dial to control an electronic menu which can be displayed on display **104**. Interface mechanism **106**, in combination with the electronic menu, and/or other interface mechanisms **102**, allows a user to control various functions of telephone **100**, such as ringer type and volume, various security features, display features, operational features, voice mail features, and so on.

In accordance with a preferred embodiment of the present invention, at least one interface mechanism **102**, **106**, or both, are reconfigured to enable a push-to-talk function when a push-to-talk mode of operation is chosen. An additional menu selection is added to the electronic menu to allow a

user to choose a push-to-talk mode of operation. When the push-to-talk mode of operation is selected, the one or more interface mechanisms are reconfigured to act as a push-to-talk switch.

A push-to-talk mode of operation, otherwise known as group mode, one-to-many mode, or net broadcast mode, typically allows a user to listen to one or more members of a communication net. A communication net is a defined list of people who are able to communicate simultaneously with each other, generally through a central station of some kind. The communication net may be predetermined, or it may be allow users to join and leave the net at will. Each net member uses a push-to-talk capable telephone to transmit information to other net members. The net can be regulated or unregulated. In a regulated net, only one net member can transmit at any given time. Permission to transmit is granted generally by a central communication manager. In an unregulated net, otherwise known as a conference bridge, more than one member may transmit to other net members at any given time, however, this often results in unintelligible reception to the users due to the interference between multiple simultaneous transmissions.

FIG. 2 is a functional block diagram of telephone **100** in accordance with the teachings of the present invention. The functional blocks are shown for illustrative purposes to explain the present invention and, therefore, many of the other functions of a wireless telephone, which are well known in the art, have been omitted for clarity. Although FIG. 2 illustrates the basic functional elements of a wireless digital telephone, the present invention is not intended to be limited to a wireless telephone, or to a specific modulation scheme, protocol, or standard.

Referring back to FIG. 2, during conventional operation of telephone **100**, acoustic energy, most often in the form of human speech, is received by microphone **108**, where it is converted into electrical energy in the form of an analog waveform and provided to analog-to-digital (A/D) converter **200**. A/D **200** receives the analog waveform and converts it into a digital representation, often in the form of a pulse coded modulated (PCM) digital signal. The digital signal is then provided to modulator **202**, where the digital signal is modulated in accordance with the particular type of transmission scheme in use. For example, modulator **202** could be a CDMA modulator, a TDMA modulator, an AMPS modulator, or any other modulator known in the art. The modulated digital signal is then provided

to RF transceiver **204**, where it is upconverted to a very high frequency for transmission through antenna **206**.

Transmissions to telephone **100** are received by antenna **206** and provided to RF transceiver **204** where the transmission is downconverted from a very high frequency to an intermediate frequency. The downconverted signal is then provided to demodulator **208**, where the information signal, in digital form, is extracted from the signal provided by RF transceiver **204**. The digitized information signal is then provided to digital-to-analog (D/A) converter **210**, where the digitized signal is converted into an analog signal, suitable for speaker **212**. Speaker **212** converts the analog electrical signal into acoustic energy which may be heard by a user. The audio output level from speaker **212** is typically only audible by placing speaker **212** in proximity to the user's ear. However, other speakers are available which broadcast audio information at much greater level so that the user can hear the audio information even if speaker **212** is not in direct proximity to the user's ear. In an alternative embodiment, telephone **100** could comprise two speakers **212**, one for use during conventional telephone operation, where audio information is broadcast a relatively low output level, and another for use during a push-to-talk mode of operation, where audio information is broadcast at a relatively high output level.

The functions of the various blocks shown in FIG. **2** are generally coordinated by processor **214**, although other configurations are certainly possible. Processor **214** is a generally a well-known digital computing device used in connection with a set of program instructions pre-stored in memory **216**. Processor **214** generally controls the functions of each block shown in FIG. **2**, although each functional element could have its own processor, memory, and instruction set for performing specific operations of telephone **100**. Processor **214** is controlled by commands entered by a user via input mechanisms **102** and **106**, as described above. Information may be visually provided to the user via display **104**.

During a conventional mode of operation, input mechanisms **102** and **106** are configured for convention telephone functions. For example, input mechanism **102** could be a key on telephone **100** for entering data, such as digits corresponding to a telephone number, or input mechanism **106** could be a shuttle dial switch for controlling volume or navigating an electronic menu offered by display **104**. Information pertaining to the electronic menu are stored in memory **216**. Input mechanism **102** and **106** send an electronic signal to processor **214**, which in turn controls any number of functional

elements to achieve a particular result, such as entering a telephone number and initiating a telephone call.

During a push-to-talk mode of operation, input mechanism **102, 106,** or both are reconfigured to act like a push-to-talk switch on a push-to-talk communication device. A user can select a push-to-talk mode of operation using a series of inputs from input mechanism **102** and/or **106** in conjunction with an electronic menu provided by display **104.** Alternatively, a push-to-talk mode could be entered by simply pressing a dedicated push-to-talk key, which, when depressed, reconfigures telephone **100** into a push-to-talk telephone.

After the push-to-talk mode of operation has been entered, one or more input mechanisms **102/106** are reconfigured to act as a push-to-talk switch. For example, after the push-to-talk mode of operation has been entered, input mechanism **106** could be preselected to act as a push-to-talk switch. In another embodiment, input mechanism **102** could be reconfigured to act as a push to talk switch. For example, a "1" key on telephone **100,** used to enter the digit "1" during a conventional mode of operation of telephone **100,** is reconfigured to act as a push-to-talk switch. To transmit audio information, i.e. speech, to one or more net members, a user of telephone **100** presses the "1" key and holds it for the duration of the transmission. Processor **214** receives an electrical signal from the preselected key, in this case the "1" key, signifying that the "1" key is being pressed. The electrical signal generally persists until the "1" key is released. During the time that the "1" key is pressed, processor **214** enables any audio information received by microphone **108** to be transmitted to one or more users. This can be done in any number of methods known in the art. For example, when processor **214** detects that the preselected key or keys is pressed, signals from microphone **108** are processed in much the same way as in the conventional telephone mode.

In addition, during the period when the "1" key is pressed, processor **214** may, in an alternative embodiment, disable speaker **212,** using techniques well known in the art. Generally, in a push-to-talk mode of operation, a user's transmission is broadcast to all net members, including the user generating the transmission. It is undesirable to have a user's transmission broadcast back to that user while speaking. Therefore, processor **214** will generally disable speaker **212** while the push-to-talk switch is pressed.

When the push-to-talk switch is released, processor **214** detects the event by detecting a change in the electrical signal sent by the key or input mechanism **102/106** being released. In response to the release of the key, processor **214** disables audio information from being transmitted to other net members. Processor **214** may disable the audio information in one of several well known methods used in the art. For example, processor **214** could simply open a switch (not shown) located between microphone **108** and A/D **200**, thereby preventing audio signals from being processed. Alternatively, processor **214** could alter the digitized audio signal at any point in the transmission path to represent a silent or near-silent state. Alternatively still, processor **214** could reduce the audio signal amplitude to a negligible level by reducing one or more amplifier gains from amplifiers located at or within microphone **108** or A/D **200**. Generally, the signal from microphone **108** requires amplification to be processed by other functional components. This is normally accomplished by using one or more adjustable amplifiers.

In addition to disabling audio information from being transmitted, processor **214**, in an alternative embodiment, re-enables speaker **110**, if speaker **110** was disabled during the period of time that the push-to-talk switch was pressed. Again, processor **214** can use one of many well known techniques to re-enable speaker **110**.

FIG. **3** illustrates a flow diagram of the method of the present invention. In step **300**, a user selects a push-to-talk mode of operation for telephone **100**. As described above, the push-to-talk mode of operation can be entered by pressing a dedicated key or switch, or it can be selected by selecting a push-to-talk mode of operation from an electronic menu using display **104**.

In step **302**, processor **214** reconfigures one or more input mechanisms to act as a push-to-talk switch. In the exemplary embodiment, input mechanism **106**, comprising a shuttle dial switch, is reconfigured as the push-to-talk switch. However, any other input mechanism **102** on telephone **100** could alternatively, or in addition, be reconfigured to act as a push to talk switch. For example, the "2" key could be reconfigured as the push-to-talk switch.

The input mechanism(s) acting as a push-to-talk switch are chosen prior to loading memory **216** with programming instructions. The programming instructions comprise computer code which allows processor **214** to control the functionality of telephone **100**. Generally, the

programming instructions are loaded into memory **216** during manufacture of telephone **100**, and are not accessible to a user. However, in another embodiment, the programming instructions allow a user to select which key will be used as a push-to-talk switch. For example, after a user selects the push-to-talk mode of operation, the next key that is pressed will be designated the push-to-talk switch by processor **214**.

The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without the use of the inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

WE CLAIM:

CLAIMS

1. An apparatus for providing push-to-talk functionality to a conventional telephone, comprising:

an input mechanism located on said conventional telephone, configurable for use as a conventional telephone function while said conventional telephone is in a conventional telephone mode, and as a push-to-talk function while said conventional telephone is in a push-to-talk mode.

2. The apparatus of claim 1 wherein said conventional telephone function comprises a data entry function.

3. The apparatus of claim 1 wherein said conventional telephone function comprises a menu navigation function.

4. The apparatus of claim 1 wherein transmissions from said conventional telephone are enabled while said conventional telephone is in said push-to-talk mode and said shuttle dial is pressed.

5. The apparatus of claim 1 wherein said input mechanism comprises at least one preselected key located on said conventional telephone.

6. The apparatus of claim 1 further comprising input means for configuring said conventional telephone for said conventional telephone mode or said push-to-talk mode.

7. The apparatus of claim 1 further comprising:

a electronic menu of options stored in a memory; and

a display for presenting said menu of options, said menu of options comprising an option for entering said push-to-talk mode; and

a processor for receiving commands from said input mechanism, for processing said commands in accordance with pre-stored programming instructions stored in said memory, and for enabling transmissions from said conventional telephone while said conventional telephone is in said push-to-talk mode and said input mechanism is pressed by a user.

8. The apparatus of claim 1 wherein said input mechanism is a preselected switch.

9. The apparatus of claim 1 wherein said input mechanism is a preselected key.

10. The apparatus of claim 1 wherein said input mechanism is chosen by a user after said push-to-talk mode has been entered.

11. A method for providing push-to-talk functionality to a conventional telephone, comprising the steps of:

selecting a push-to-talk mode of operation for said conventional telephone; and

reconfiguring an input mechanism located on said conventional telephone from a conventional telephone function to a push-to-talk switch.

12. The method of claim 11 wherein said conventional telephone function comprises entering data into said conventional telephone.

13. The method of claim 11 wherein said conventional telephone function comprises navigating an electronic menu.

14. The method of claim 11 wherein the step of selecting a push-to-talk mode of operation comprises:

displaying a menu of options, said menu of options including an option for entering said push-to-talk mode; and

selecting said push-to-talk mode.

15. The method of claim 11 wherein the step of selecting a push-to-talk mode of operation comprises:

displaying a menu of options, said menu of options including an option for entering said push-to-talk mode; and

selecting said push-to-talk mode using a second input mechanism.

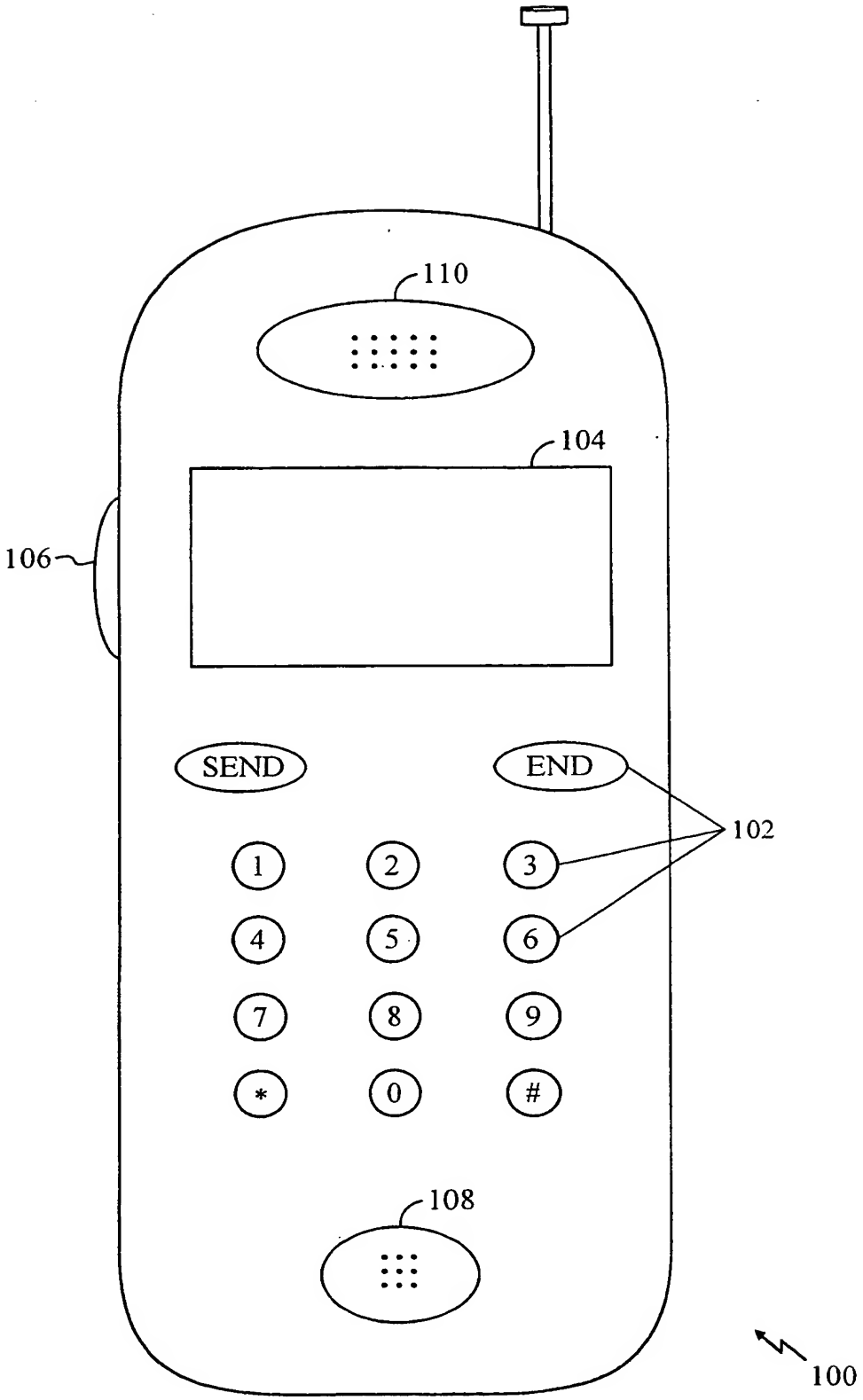

FIG. 1

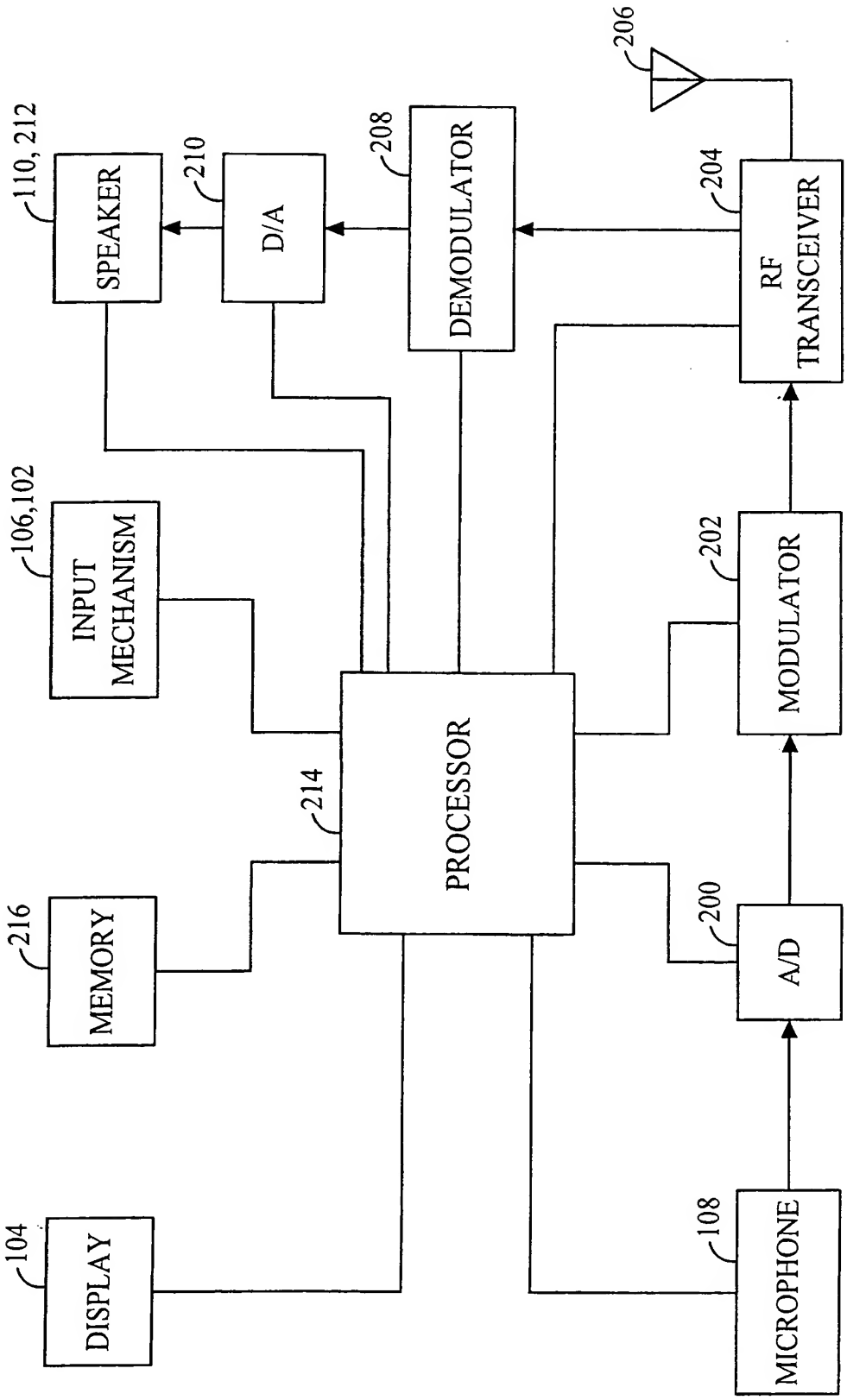
206
110, 212
SPEAKER
210
D/A
208
DEMODULATOR
204
RF TRANSCEIVER
106,102
INPUT MECHANISM
202
MODULATOR
214
PROCESSOR
216
MEMORY
200
A/D
104
DISPLAY
108
MICROPHONE

FIG. 2

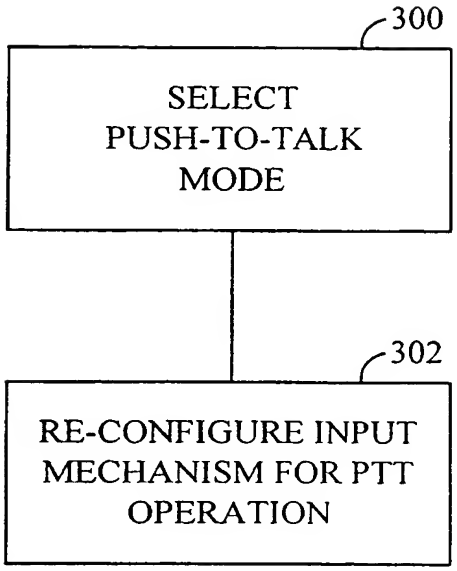

FIG. 3

INTERNATIONAL SEARCH REPORT

Intern nal Application No
PCT/US 00/31806

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/725 H04Q7/28 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 881 370 A (FORD ROBERT B ET AL) 9 March 1999 (1999-03-09) column 1, line 60 -column 3, line 39	1-15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 April 2001	20/04/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Vaucois, X

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern nal Application No
PCT/US 00/31806

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5881370 A	09-03-1999	GB 2318706 A	29-04-1998